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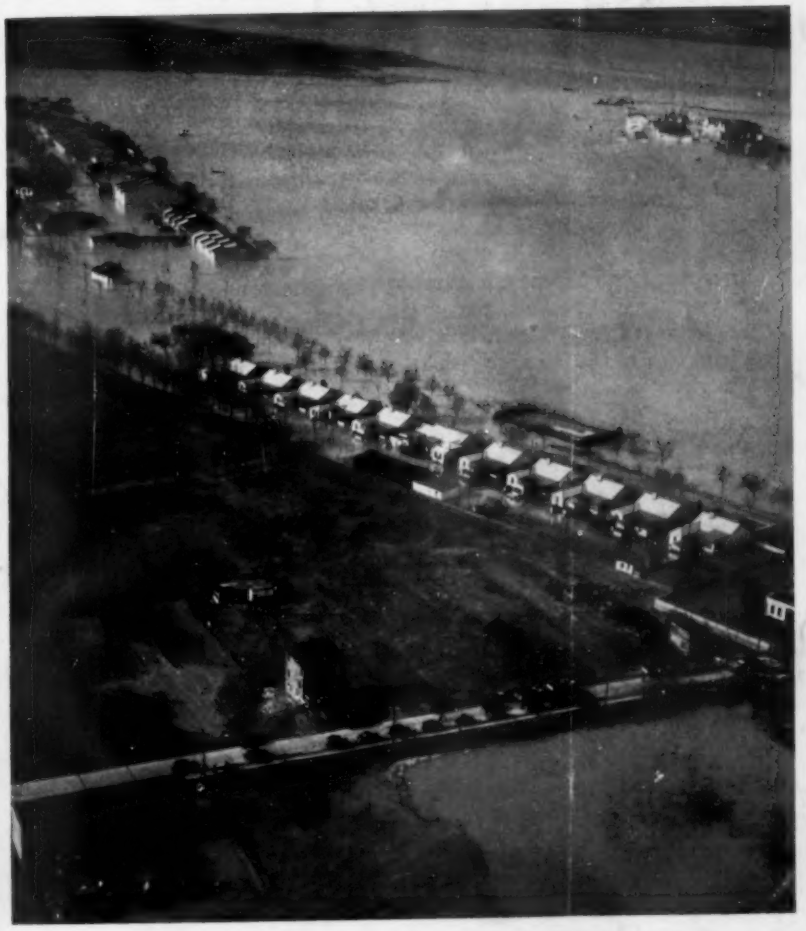
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



MARCH 28, 1936

"Rain Was Upon the Earth"

See Page 197

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DO YOU KNOW?

The lake connected with Boulder Dam is to have a shoreline 550 miles long.

Ice cream made for diabetic patients is made largely of cream and eggs with saccharine to sweeten it.

Japanese women used styles of hairdressing to express emotion, such as joy, mourning, or formal solemnity.

The sharp silica dust from sand or quartz, that injures the lungs of miners, can penetrate even steel, making it weak and brittle.

Electrical equipment has been devised so that florists can get "clean dirt" for plants by sterilizing the soil to kill weed seed, insects, and fungi.

In making red cedar oil from sawdust by steam distillation, manufacturers use old fence rails, house timbers, or roots and stumps of cedar trees.

In a recent government campaign to seize worthless old drugs, eleven truckloads destroyed in Texas included some medicines as old as the Spanish-American war.

A company formed in Brazil will extract shark liver oil, said to be richer in Vitamins A and D than good cod liver oil.

Prickly pear cactus plants, once natives of America, are serving as barbed wire substitutes in the war zone of Ethiopia.

It is thought likely that California's present walnut orchards will continue producing nuts until they are about a hundred years old.

Twelve states and the U. S. Department of Agriculture have opened a cooperative laboratory to study and test soy beans for industry.

The bookplate idea is quite old—a clay tablet of the seventh century B. C. is marked "Property of Assurbanipal, king of the world, King of Assyria."

So persistent is the attempt to prove or solve mathematical problems that experts consider unsolvable, that Teachers College, Columbia University, gets several "solutions" each week to the problem of trisecting an angle by means of ruler and compass.

WITH THE SCIENCES THIS WEEK

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ASTRONOMY

Gigantic Stellar Explosion Great Event of Astronomy

Heavenly Happening Seven Million Years Ago Now Visible To Astronomers as Super Nova Virginis, 1936

SEVEN million years ago a terrific outburst occurred in the distant part of the universe that astronomers know as the "nebulae of the Virgo cluster."

Now at the Carnegie Institution of Washington's Mount Wilson Observatory, Calif., there has been discovered this gigantic stellar event which astronomers call a "super nova," an extraordinary new or temporary star.

It is one of the most energetic star explosions ever recorded by astronomers, and so remote that news of its happening, via light waves, has just arrived on earth.

So faint that the world's largest telescope, the 100-inch on Mount Wilson, was needed to record its brief rise to fame and fall to obscurity, the super nova nevertheless at its maximum gave off thirty million times as much light as our sun.

In the brilliant explosion, the star attained a velocity of expansion of 3,700 miles a second or more than 13,000,000 miles an hour.

Dr. Edwin Hubble, astrophysicist of Mount Wilson Observatory, famed for his discoveries of distant galaxies of stars, and Glenn Moore, assistant on the 100-inch telescope, discovered "Super nova Virginis, 1936" as the star will be called.

For seven years they had been patiently searching among the nebulae of the Virgo cluster for such a stellar outburst.

One in 500 Years

The rarity of such a happening in the heavens can be realized by the estimated frequency of one super nova per nebula or galaxy of stars in each five hundred to a thousand years. Thus seven years was a short period of searching.

The outburst happened in the nebula listed in astronomical records as NGC 4273. The star affected is 29 seconds of arc from the nucleus or heart of this nebula. First photographed on Jan. 21, it attained on Feb. 16 its maximum of astronomical magnitudes ranging 14 to 15.4. Then it faded rapidly.

The tiny pinpoint of light, while an exploding star, is so faint as viewed from the earth because it is so distant from us. By other observations, astronomers estimate that the nebula in which the super nova is located is so remote that light takes seven million years to travel from there to the earth. Light is the speediest thing in the universe, traveling 186,000 miles per second, or six million times a million miles per year. Multiply this latter figure by seven million and you have the mileage from here to the extraordinary new discovery.

The super nova has now faded from view even through the largest telescopes. It will probably never be sighted again. But it has won a secure place in astronomical records and study of its light spectra is expected to give more information on the way the universe operates.

Others Brighter

Famous among the rare super novae of the past is Tycho's star, which appeared in November, 1572, and was for some days visible in daylight and brighter than Venus at her best. Another temporary star, observed by Kepler in 1604, was as bright as Jupiter and remained visible for two years. These were much closer to the earth than the super nova just discovered and were therefore seen with unaided eyes.

Latest of novae or temporary stars, but not in the super class with the latest Mount Wilson discovery, was Nova Herculis, which burst forth shortly before Christmas, 1934, and became easily visible in the northwestern evening sky. The super nova in Virgo just observed probably put forth some two thousand times the energy of Nova Herculis, but the latter was more brilliant only because it was closer and in our own galaxy of stars.

Scientists speculate on what remains of novae when they fade away. One suggestion is that they become stars consisting of neutrons with no ordinary matter in their make-up. The neutron is one of the basic building blocks of matter and it was discovered in 1934. Such a spent star of neutrons would be extremely dense. The earth's mass on the same density would be a ball less than two miles diameter.

The outburst of a nova transcends in magnitude all other known physical catastrophes. Astronomers do not know just what happens. Favorite among theories is that there is a tremendous release of energy within the atoms of matter composing the star. Another suggestion is that novae occur when two stars collide.

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ARCHAEOLOGY

Librarians Had Troubles, Even in Ancient Greece

EVEN in cultured old Athens, it turns out, Greek readers would sneak books out of libraries, against the rules.

This marble sign that some desperate librarian set up, 1,800 years ago, has been unearthed by American excavators in Athens:

"No book shall be taken out. We have sworn it! The library will be open from the first hour until the sixth."

The notice, inscribed in Pentelic marble, has been uncovered by the expedition of the American School of Classical Studies, Prof. T. Leslie Shear of Princeton, field director of the expedition, announced.

The Greek inscription was dug up in the Athenian market place, and is believed to have belonged in front of the Library of Trajan, about 100 A.D. Library hours, "first hour until the sixth," were from seven in the morning until noon.

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WARNING

This marble sign reveals that in Athens librarians faced problems that are still familiar.

METEOROLOGY

Thaw-Saturated Earth Forced Eastern Rivers to Overflow

Winter of Above-Normal Rain and Snowfall Combined With Below-Normal Temperatures Led to Catastrophe

RAINS gorged Eastern rivers into disastrous flood in just a few days, but behind the rains was a background of excessive snow, that lay in the mountain valleys all winter long and had the soil saturated when the rains began to fall. The new water thus could not sink into the earth, any more than it could on a thatched roof, and had nowhere to go but off.

That in a nutshell is the meteorological background of the recent crucial situation in a dozen Eastern and Southeastern states and all along the course of the Ohio river.

Weather Bureau records show that in the area responsible for the Ohio-Potomac flood situation, there was more than normal precipitation all winter long. During December and January, the rain and snowfall averaged from normal to above 125 per cent. of normal, and in February the precipitation ran up to more than 150 per cent. in a small area near the coast.

At the same time that the precipitation records were running above normal, temperatures dropped far below normal and stayed there for the duration of the winter. That meant that what normally falls as winter rain or short-lived snow came down this time as snow that remained unthawed on top of the hard-frozen ground. The rivers also were thickly sheathed with ice, so that when the first thaw came, at the beginning of March, there was some anxiety lest it be accompanied by rains, which might have caused even worse floods than the recent ones.

However, the river ice broke up quietly and went away without trouble, and the snow in the mountain valleys simply melted and soaked down into the ground. This might have been a fine thing—but the rains piled up on top of this saturation.

The floods were the evil-doing of a single massive storm area, that moved up along the southern Appalachian highlands and became practically stationary over central Virginia. Heavy with moisture from the Gulf, the storm area poured its waters with almost tropical violence into the steep-sided mountain valleys that drain to the Ohio on the west and the Potomac on the east, as well as into the northward-draining Conemaugh valley in Pennsylvania, famed for the Johnstown flood of 1889. From three to five inches of rain were wrung out of the clouds, at some of the upland weather observation stations.

The severest effects were felt at Pittsburgh, where the Allegheny and Monongahela rivers unite to form the Ohio. Here the river gage registered higher than it had previously in all recorded history—and scientific observations of the Ohio at what is now Pittsburgh go back into pre-Revolutionary times, to include the only flood of comparable magnitude, in 1763. On the Potomac, Washington, D. C., experienced the highest water since 1889.

The narrowness of the inter-mountain valleys is mainly responsible for the distressed condition of the Virginia, Maryland and Pennsylvania towns, of which Johnstown is a classic example. These towns are built along the only available routes for highways and railroads, which are right along the rivers. Frequently they are "one-street" towns, so that a flood "catches them endwise."

In the emergency, aviation proved its value not only for transportation but for instantaneous, effective, and accurate estimation of the conditions existing in any locality. One of a series of aerial survey photographs made by the U. S. Army Air Corps appears on the front cover of this week's SCIENCE NEWS LETTER. At the upper right it shows the U. S. Naval Air Station at what is usually the bank of the river. At the left is Bolling Field, army air station.

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ASTRONOMY

Finest Fireball in Years Being Tracked By Observers

METEOR observers are on the trail of the "finest fireball seen for years" in the Middle Atlantic section, but are not yet able to plot its sky path accurately.

Prof. C. P. Olivier, director of the University of Pennsylvania's Flower Observatory, Upper Darby, Pa., has studied reports on the meteor that flashed early on Saturday morning, March 14.

Apparently the meteor path started above a point not far from over Norristown, Pa., and ended over the ocean off Asbury Park, N. J. Prof. Olivier is asking observers for more information in order to complete this record for science.

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C. C. C. BUILDS RAMPARTS FOR THE ARMY

When flood waters in Washington, D. C., threatened the office buildings of the War and Navy Departments, an army of "shoveleers" drafted from the C. C. C. and other emergency work labored in the rain to erect a formidable defensive earthwork faced with sandbags, strong enough to withstand the fire of artillery as well as the water of the Potomac.

THIEVING RIVER

The nation's capital was fortunate among the flooded cities, but here also "That Ole Man River" took his toll among the industrial plants of the Georgetown riverfront. The troubled waters in the foreground are those of the river itself, but at the left, equally wet, is a business street. This photograph and the one on the front cover were taken by the U. S. Army Air Corps.

METEOROLOGY-CONSERVATION

Floods and Dust Storms Children of the Same Folly

Destruction of the Living Sod and Its Spongy Layer Of Top Soil Lets Dust Blow and Water Run Away

By PROF. PAUL B. SEARS, of the University of Oklahoma, Author of "Deserts on the March."

NATURE has again been good enough to warn us, by a perfectly synchronized drama of dust-storms in the West and disastrous floods in the East, of the wrath that is brewing against our Western civilization unless we mend our ways. The two extremes, seemingly unrelated, are absolutely facets of the same picture.

The dust storms are not simply a matter of unavoidable drought, but a result of the destruction of the living sod which alone can bind the looser soil types of the semi-arid high plains. This destruction has had a two-fold source. The range has been stubbornly overloaded with cattle almost ever since the extermination of the great buffalo herds. Wise cattlemen know the danger of this, but the pressure to liquidate their heavy debts often leads them to take a disastrous chance. The sod, cropped too close, affords too little protection against the prevalent winds of late winter and spring.

Even more serious is the second source of trouble—the attempt to farm the high plains in wheat, using power machinery. Even this year, with the somber warnings of last year's dust storms, there have been men who continued the losing gamble—one operator for example having set out not less than seven thousand acres of wheat. The wheat is as a rule unable to gain sufficient foothold during the winter months to protect the soil. Comes spring with its high winds, and the terrific dust-storms arrive.

What has this to do with the destructive floods that recently raged throughout the East? Recently travelling through the oldest agricultural states of the Union, the writer has scarcely seen a place where the old top layer of soil is left. Careless methods of farming have allowed it to wash away in the past two and three centuries. The insidious thing is that this has taken place without much sculpturing of the ground, so that unless one is a trained observer who knows what the soil should be like, he is unaware of the profound destruction that has been wrought.

It is this dark, spongy, top layer of soil—what the specialists call the A-horizon—which is our only effective protection against flood. One can build dams downstream, construct mazes of levees and ditches, and still not touch the source of trouble. The water must be caught where it falls, and the one thing that can arrest it and hold it in place is the dark A-horizon of the soil. This layer has been made into a perfect sponge by ages of accumulation of plant material. It will retain the water, filter it, and slowly release it in a limpid stream.

Unless we take measures, through proper use of the soil, to restore this layer—no easy task—we may expect a recurrence of disaster every time there are continued heavy rains. The problem is more a matter of biology than of engineering, and the sooner we realize it the better. Our present tactics, if we could really see them as they are, would make the wise men of Gotham blush.

Modern medicine has learned that pestilence is easier to prevent than cure. Proper land management will vaccinate our land against future floods. Nothing else will.

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ENGINEERING

16-Mile Long Bridge May Link Denmark and Sweden

A GIGANTIC engineering project which will link Denmark and Sweden with a 16-mile long bridge, provide a super-high-speed highway across the island of Zealand on which Copenhagen is situated, and also span the Great Belt separating Zealand from Funen and the rest of Denmark, has been proposed by three Danish construction firms.

The Danish parliament is reported to be considering the plan with favor, although its total cost will be 628,000,000 kroner, or approximately $150,516,000.

Construction would employ 12,000 workmen during a ten-year period.

Especially favored by Scandinavian industrial and business circles is the 16-mile long bridge which would join Copenhagen in Denmark and Malmoe in Sweden, across the Ore Sund. Its estimated cost of $33,744,000 would be borne jointly by the two countries.

The great high-speed motor highway across the island of Zealand would cost $48,618,000, and the bridge over the

Great Belt would cost $57,054,000.

Denmark, according to the plan, would pay its cost by money raised one-third by loan, one-third by motor taxes and one-third through government subsidy, especially to railroads.

The estimated annual construction costs would actually be less than the yearly cost of present road maintenance in Denmark.

Construction materials, including steel and coal for fuel, would be purchased abroad at a cost of $20,102,000; the rest would be from Denmark itself.

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PHYSIOLOGY

Nerves Can Double for Others In Controlling Heart Action

Tiny Fibers Heretofore Not Understood by Science May Act for Nerves Which Affect Heart Beat

SCIENCE'S first step toward an understanding of recently discovered nerve fibers for speeding up heart action, a discovery which may lead to their identification as hitherto unknown sympathetic nerves, was announced to the New York Academy of Sciences by Dr. Lucien A. Brouha of the University of Liége, Belgium.

Discovered at the University of Ghent in 1934 by Jourdan and Nowak, the tiny fibers have remained pretty much of a mystery to science, the only definite fact known about them being their position alongside the vagi nerves which run from the brain to the heart and which serve to retard the cardiac beat.

Even now, Dr. Brouha explained, little is known of their function in the normal body; but in dogs whose sympathetic nervous system has been removed these new nerve fibers take its place. Indeed, so successfully do they substitute for the missing nerves that Dr Brouha finds it absolutely impossible to distinguish a normal dog from one without its sympathetic system.

This finding is in direct contrast to results obtained with cats by Dr. Walter B. Cannon at the Harvard Medical School, for removal of the sympathetic system in these animals made them distinctly apathetic, incapable of exertion to any marked degree.

It was the ability of the new nerves to replace the sympathetic system in dogs that led Dr. Brouha to his conclusions concerning the possible function of the nerves as a substitute for the removed system. In the normal body, he believes, the nerves may aid heart regulation to a very small extent, although he said that in all probability they have additional functions as yet undiscovered by science.

In research leading to these results, Dr. Brouha conducted pioneer treadmill tests on dogs both before and after removal of the sympathetic system. The experiments were performed in cooperation with Dr. David B. Dill of the Harvard University Fatigue Laboratory where Dr. Brouha is carrying on his investigations this year.

Outstanding among his finds were that the general behavior of a dog whose sympathetic chains have been removed remains normal, although the heart beat of the animal at rest is slightly less than normal, and that emotional excitement produces the usual definite cardiac acceleration.

If the dog takes light exercise, Dr. Brouha found, the cardiac rhythm remains below the normal rate, even during a long experiment in which the total amount of exercise done is considerable. When this exercise becomes more intense, however, the cardiac acceleration occurs in proportion to the intensity of the exercise—exactly as it does in the normal animal.

Another important find was that the capacity, to stand very intense exercise is not at all diminished three months after the removal operation, that time being necessary for the dog to recover from the effects of the operation.

Experimentally checking the possible influence of a rise in body temperature or muscular metabolism, Dr. Brouha found that they are definitely not responsible for the accelerated heart beat. Nor are adrenalin or sympathin, for with the removal of the sympathetic system, these hormones are not secreted into the blood stream.

This leaves only increased activity of the cardio-accelerator fibers of the vagi nerves to explain heart regulation. The activity of these fibers, Dr. Brouha says, is also accompanied by a reduction in activity of the retarding fibers of the vagi nerves whose functions along these lines are well known.

Testing the sugar and lactic acid content of the blood and the alkaline reserve of sympathectomized dogs, he found them all to vary within normal limits.

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ANATOMY

Nose Grows Longer With Age, Mouth Gets Wider

WHEN a human face grows old, the features actually change in pattern. The nose grows wider and longer. Ears lengthen. Mouth spreads wider.

These signs of age, which almost defy beauty camouflage, are detected by anthropological measurements, reported by Dr. Ales Hrdlicka, well-known anthropologist of the Smithsonian Institution. People are vaguely conscious of the altered pattern when they greet old friends, and cannot account for a familiar face seeming somehow strange.

Dr. Hrdlicka bases his conclusions on measurements of thousands of "Old Americans" that is, Americans who have three or more generations of ancestry in this country, and also on study of Indians, Eskimos, and Negroes.

The mouth begins to widen from early life and continues to change, the anthropologist finds. Effects of age on this feature are more marked than the changes in the nose.

Although women have smaller mouths than men, women's mouths are really larger in relation to their body height.

A nose alters mainly by widening, though there is some increase in length.

Dr. Hrdlicka's measurements confirm the point that people in hotter climates have broader noses than people in cold climates. It is believed that this is an adaptation to the breathing needs in different climate surroundings.

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DISCOVERER OF NEW NEBULAE

Mrs. Muriel M. Seyfert, young research assistant at Harvard College Observatory, who has just discovered three new ring nebulae in the Milky Way. She is shown inspecting one of the photographic plates taken at Harvard's station in Bloemfontein, South Africa, on which the new star-dust rings were photographed.

ASTRONOMY

Three New Planetary Nebulae Discovered In Milky Way

Rings of Dust, Each Believed Larger Than Our Entire Solar System, Found On Photographs From South Africa

THREE tremendous rings of star-dust, hitherto unknown planetary nebulae, have been found in the Milky Way by Mrs. Muriel M. Seyfert, young research assistant at the Harvard College Observatory.

Each of them is believed to be hundreds of times larger than our entire solar system, yet they are so far distant they can be seen only through a moderately powerful telescope. Even then the rings are not visible to the human eye but can be detected only on sensitive photographic plates, where they appear as luminous rings surrounding brilliant nucleus stars. These center stars would, of course, be visible through large telescopes.

Actually the tremendous nebulae are not rings but spheres or balls of expanding gas and tiny particles, some of them probably as fine as molecules. From their appearance on plates, however, astronomers have named them "ring nebulae." Mrs. Seyfert's discoveries were made through an examination of plates taken at Harvard's station at Bloemfontein, South Africa.

While sufficient data have not yet been assembled to permit accurate calculation of the size and distance of the rings, Harvard observers believe that like most of the approximately 130 known planetary nebulae, those found by Mrs. Seyfert are several hundred light years away from the earth and have a diameter that is expressed in billions of miles.

At present, astronomers express their size in terms of the angle formed by imaginary lines drawn from the observer's eye to the top and bottom of the stellar body. By this calculation two of the nebulae have an angular diameter of about one-fiftieth of a degree. The third nebula is about one-half this size.

Very Light

Astronomers also believe that the rings have a density similar to that of other planetary nebulae—a density 1,000,000,000,000,000 times lighter than air. So rare is the atmosphere of the rings that, although only 12.5 cubic feet of air weigh a pound, it takes approximately 100,000 cubic miles of planetary nebular space to give the same 16 ounces.

This density is considerably less than the most perfect vacuum obtainable on earth, yet the ring nebulae are so tremendous, their total mass is measured in millions of millions of millions of millions of tons. This would be a figure followed by at least 24 zeros.

The newly discovered rings are located in the southern constellations of Norma, Carina and Ara. The nebulae of the first two are larger while their center stars have a brightness magnitude of 13.6. The Ara nebula is even more brilliant, having a magnitude of 11.9. An unusually perfect ring shape marks the Norma body.

May Come From Novae

Planetary nebulae, whose origin and place in the scheme of cosmic evolution is one of the unsolved mysteries of astronomy, are comparatively rare. From their appearance astronomers know each is composed of a bright nucleus star enclosed in concentric spheres of expanding gas and small particles which give off light when excited by the center star. This has led scientists to believe that they may be the result of the catastrophic explosion of novae, or new stars like the famed Nova Herculis, which occurred hundreds of years ago.

PHYSIOLOGY-PSYCHOLOGY

Brain Transplanted From Toad to Frog

THE FANTASY of transplanting personalities from one man to another, foundation of many movie romances and comedies, has been realized in the world of the lower animals by the transplantation of a toad's brain into a frog's head. The frog then proceeded to behave in a partially toad-like manner.

The experiment was performed by Prof. H. Giersberg of the University of Breslau. (*Die Umschau*, Feb. 23). Using an exceedingly delicate surgical technique, he transplanted into the heads of a number of frog tadpoles the brains of an equal number of toad tadpoles. Most of the tadpoles survived only until the time came to lose their tails and gills and grow legs for life on shore, but two of them came through all right, and grew up to be normal-looking frogs.

One of the animals, equipped with the front part of his own brain and the middle and back parts of a toad brain, showed certain toad-like traits in his actions. He hopped little and crawled much, which is toad rather than frog behavior. He also kept digging shallow pits in the wet sand, as though to hide himself. Frogs bury themselves only when winter approaches, but toads dig themselves in practically every day. Thus, though his digging was not abnormal for a frog, the time at which he did it was distinctly "toad time."

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ARCHAEOLOGY

Ox Buried With Honors Unearthed In Transvaal

REMAINS of an ancient people who thought highly of cows or oxen, even going so far as to bury one of these animals like a human, have been revealed by excavation in the Limpopo Valley, Transvaal.

Bones of cows or oxen were found mingled with human bones, when Capt. G. A. Gardner excavated a site known as Bambandyanalo, on behalf of the Archaeological Committee of the University of Pretoria. Nothing like this ox cult has been found heretofore, he reported.

The animal given a human type burial was surrounded by small stones and its bones were covered with upturned pieces of pottery, exactly as graves of the people were arranged.

The site is believed to be a habitation of the first Bantu natives to find their way into South Africa. Capt. Gardner has not yet estimated the age of these immigrants, but the Bantu are generally supposed to have reached South Africa not earlier than 900 A. D.

A huge trash pile of ash was found, fully 20 feet deep, containing animal bones and sweepings from huts. This indicates that the people occupied the settlement many centuries. Quantities of burnt grain were found, showing that the people were farmers as well as cattle owners. Today the climate is too arid for farming.

The site, so far only partially explored, reveals that South Africa had an Age of Bronze, after all. Heretofore, archaeologists have believed that this part of the world had the unusual experience of jumping from the Old Stone Age into the Age of Iron, skipping the intermediate stages of progress in which advanced stone work would be done, and then copper and bronze introduced.

People of the newly explored settlement made a great variety of pottery, evolving from crude objects lacking decoration to pots of unusual shape and decoration. Capt. Gardner plans to continue investigation of the important site.

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CHEMISTRY

Non-Slippery Floor Wax Is Patented

NO DANGER of feet slipping, or of rugs skidding on floors waxed with the non-slippery floor wax for which a patent was recently granted to a Brooklyn, N. Y., inventor.

The wax is claimed to give a hard, continuous film capable of yielding a high, lasting, semi-transparent polish. Its novel characteristic is a "higher coefficient of friction," which means that it is less slippery than conventional waxes. Tests carried out by the inventor, using sole leather against wood waxed with the new product, indicate that a floor would be less than half as slippery as it is with conventional waxes.

This non-slippery property is obtained by adding to the mixture of beeswax and carnauba wax generally used in making floor waxes about 10 per cent. of high grade light-colored raw rubber.

"Floor wax containing this amount of added rubber," states the patent, "acquires a coefficient of friction making it safe in the household but without forfeiting the advantages of wax properties." Walking on floors waxed with it, or ordinary furniture movement, the inventor claims, does not mar its surface.

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ARCHAEOLOGY

Texas Caves Visited By Prehistoric Americans

THE SCENIC Longhorn Caverns of Texas were visited by prehistoric Americans.

This is the deduction from ancient souvenirs of men found in the caverns by Dr. Charles N. Gould, National Park Service geologist.

Unlike modern man's traveling trademark, his carved initials, the prehistoric Indians left as relics of their stay such things as arrow points, grinding stones, and many animal bones. Some of the meat bones were split for the marrow inside, good proof that man camped and ate at the site.

Making allowance for the fact that the caves are of the "trap cave" type into which animals and objects can fall, Dr. Gould stated:

"Longhorn Caverns bear every evidence that they once served as shelters and probably as homes for prehistoric man."

The caverns today are a state park, noted for their fantastic stalactite and crystal formations.

Science News Letter, March 28, 1936

PHYSICS

Sunshine Strongest Atop Of High, Cold Mountain

SUNLIGHT beats most strongly at the tops of high mountains, where hardy climbers find it impossible to get warm.

This paradox of solar physics was brought down from the heights of the Andes by an exploring party of the Smithsonian Institution headed by C. P. Butler. With instruments packed up steep trails, they found that the sunlight at the top of Mount Aunconquilcha, nearly 20,000 feet high, was nearly one-sixth greater than it was at sea level. Yet in the middle of the day the temperature hardly rose above the freezing point.

Although the sunlight brought no warmth, it did carry the constant menace of sunburn. At a mining camp 2,000 feet below the summit, the workers were burned almost black.

Science News Letter, March 28, 1936

ENE FIELDS

AERONAUTICS

Rocket Motor Develops 200 Horsepower Per Pound

THE "MOTOR" in the experimental rocket of Prof. Robert Goddard yields over 200 horsepower per pound of weight, according to his new report on research progress issued by the Smithsonian Institution. Speeds as great as 700 miles an hour are developed with the Goddard rocket.

By comparison the motor of a typical light motor car weighs seven pounds of engine for each horsepower developed.

Modern military aircraft engines have one and a half pounds of motor for each generated horsepower. Special aircraft motors like those of the Italian racing planes have cut weight so that they need only three-quarters of a pound of motor for each horsepower.

The new high-speed streamlined trains powered by Diesel-electric have motors weighing ninety pounds for each horsepower they develop.

Science News Letter, March 28, 1936

ETHNOLOGY

Glorious to be Free of Husband, Women Sing

"OH, HOW glorious it is to be free and not to belong to a husband."

So the women in Liberia sing, on occasions, reports Miss Etta Donner of the Vienna Africanistic Institute, who has returned from studying the social position of women in Africa's tropic woods.

Young Miss Donner traveled alone and was not afraid. White people are much respected where they are not yet well known, she has found.

Girls in Liberia are kept in the "sandbush" for months or even several years, and nobody is allowed to approach them, Miss Donner learned. Married women have a hard time, and an inferior position. Their only importance is to produce families, and they are not even allowed to punish the children.

Unmarried mothers are not held in contempt, and the children are their own, Miss Donner reported. What is extraordinary to civilized people is finding that a father of an illegitimate child tries his best to purchase it, and offers high sums.

The white woman told of being admitted to a secret African alliance, the Serpent's Federation, which has international standing in Africa, for when she displayed the secret signs of membership, she was cordially received in other clans.

The initiation ceremony consisted in pushing her from dazzling sunlight into a dark cave where she was frightened by wild masks and imitations of animal voices in terrible uproar. Later, she was given a horn containing an antidote for serpent poison. This mixture of plants is now being chemically analyzed, she stated.

Women of Liberia have some advantages. They talk a language of their own, which no man is allowed to pronounce.

Science News Letter, March 28, 1936

PHYSICS

Energy States in Atoms Likened to Angry Women

NO ATOM, of course, has white teeth and flashing eyes. But in many ways an atom bears more resemblance to an irritated female than it does to the mechanical models which have been in vogue until recently.

Speaking at Swarthmore College on "The New Era in Science," Dr. W. F. G. Swann of the Bartol Research Foundation likened the "energy states" which physicists speak of when talking about atoms to states of feminine temperament. Given a sufficient degree of anger and such a temperamental state may change abruptly into another one; ecstasy into fury, serenity into chaos. Both for woman and atom the tendency to change of state depends upon a combination of internal and external circumstances. The degree of wrath which produces the change is analogous to what physicists call a "matrix element" for the atom.

Physicists never know when any particular one of these atomic energy states will change into another one. Some even believe that such predictions are fundamentally impossible. Need the obvious comparison be stated?

Why does a woman show anger? Ask her why she weeps and the answer may very likely be "Just because." So also to many physicists it is meaningless to ask "Why" in reference to fundamental phenomena.

Science News Letter, March 28, 1936

MEDICINE

Glass Tube Put in Man's Blood Vessel For Study

A METHOD of gaining new knowledge on obscure diseases of blood vessels and on the watery swellings known as edema was described by Dr. Eugene M. Landis, of the University of Pennsylvania Medical School, at the meeting of the American College of Physicians.

For the development of this method, which was called the most outstanding piece of medical research in 1935-36, Dr. Landis was awarded the John Phillips Memorial medal of the college.

Gray-haired physicians, leaders in the profession, sat taking notes as the thirty-five-year-old doctor described his method and indicated its possibilities.

The method is designed to give information about the state of minute artery endings called capillaries. These are found at the tips of the fingers and toes, in the nail beds, and just under other outer surfaces of the body. In certain conditions like Raynaud's disease, in which the fingers and toes are always cold and an unhealthy white color, physicians know a disturbance of the blood flow through the capillaries is to blame. Just what the disturbance is and what to do for it are still unsettled questions which are engaging more and more the attention of medical research workers.

The method Dr. Landis devised for investigating the state of these capillaries is to insert a very tiny glass tube called a pipette into a single capillary in the bed of a man's nail or in tissues of other animals. The capillary blood vessels and the glass tube are both so small that Dr. Landis has to work under a microscope.

By this method he has measured the passage of fluid through the walls of normal capillaries into the surrounding tissues. With this as a standard, he measured the passage of fluid when the capillary walls had been damaged by chemicals or by mechanical injury. He found that the fluid passed through the damaged capillary walls from five to seven times more rapidly than normal. This finding shed light on the condition known as edema in which apparently too much fluid passes through the capillary walls.

Dr. Landis was called one of the most brilliant of the younger investigators in this country, a man with a past record unequalled by anyone of his years.

Science News Letter, March 28, 1936

ASTRONOMY

Winter Constellations Disappearing

Great Dipper, Familiar Constellation of Many Names, Seen to Best Advantage in April; Planets Scarce

By JAMES STOKLEY

IN THE evening skies of April the most conspicuous of all star groups appears at its best. This is the Great Dipper, which is now high overhead to the north in the evening at the times for which these maps are drawn: ten o'clock on April 1, nine on the 15th and eight on the 30th. Almost everyone knows it, though in other countries it has other names. The English, for instance, call it either "the plough," or "Charles' wain." In Germany it is called by a similar name, "Karlswagen," while in some parts of France it is called casserole, or saucepan.

This group, however, is really part of Ursa Major, the great bear, and the handle of the dipper is supposed to form the bear's tail—an appendage such as no member of the genus now extant is able to boast! It is particularly surprising to find that in widely scattered parts of the earth it was called by a similar name. For instance, the Finns called it a bear, and so did the American Indians, but at least they knew their bears a little better. To the Iroquois, the three stars forming the handle of the dipper were not the tail, but three hunters pursuing the bear. The first, they explained, carried a club to slay the beast, the second a pot in which to cook his meat (and a faint star close to this, called Alcor, was supposed to represent the pot) while the third had a bundle of twigs to make the fire needed for the culinary process.

Big and Little

Many of the celestial animals appear in duplicate, and the bear is one of these. The little bear, Ursa Minor, appears below the great one. The pointers, the two stars in the bowl of the big dipper, show the direction of Polaris, the pole star. This is the end of the handle of the little dipper, and the tip of the little bear's tail. It is called the pole star because it is close to the North Pole of the heavens, the point of the sky directly over the North Pole of the earth, and around which all the stars apparently turn. Its proximity to this point keeps it always in approximately the same position, because it moves in a very small circle.

As high in the south as Ursa Major is to the north one can now see the lion, Leo. In this is a group called the sickle, of which Regulus is below, at the end of the handle. To the east is Bootes, in which shines the brilliant Arcturus. A good way to find this star is to follow the curve of the handle of the great dipper to the south; if you go still farther you come to Spica, in Virgo, the virgin, to the right of which is a quadrilateral of stars forming Corvus, the crow. Below Bootes is the figure of Hercules, and below this, close to the horizon, Vega can be glimpsed, part of Lyra, the lyre.

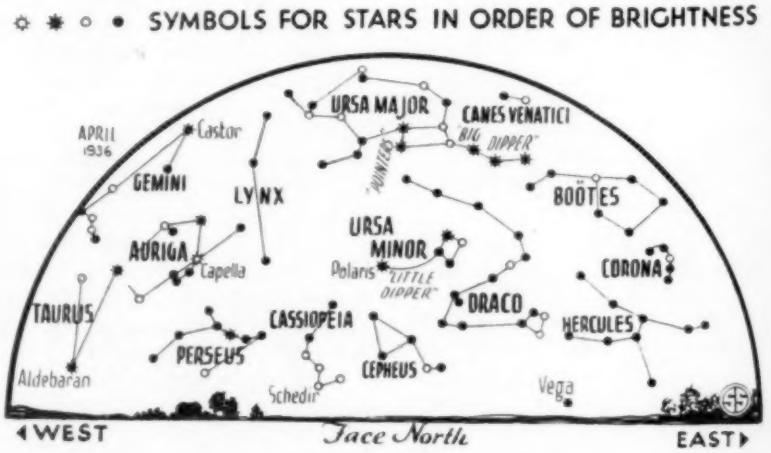
Winter Stars Leaving

In the western sky appear now for the last time this season those constellations that made the winter evening skies so glorious. Orion is almost directly west, but he is only partly visible; for his feet are below the horizon at the time of the maps. Sirius, the dog star, part of Canis Major, the greater of his two dogs, is in the southwest, and above it is Procyon, in Canis Minor, the lesser dog. The head of Taurus, the bull, with ruddy Aldebaran, is low in the northwest, and next to it is Auriga, the charioteer, with the first magnitude star Capella. Directly above Orion are the twins, Gemini, with the stars Castor and Pollux, the latter, the brighter, to the south. Near the horizon, to the north is Cassiopeia, like a letter W on end.

No Planets

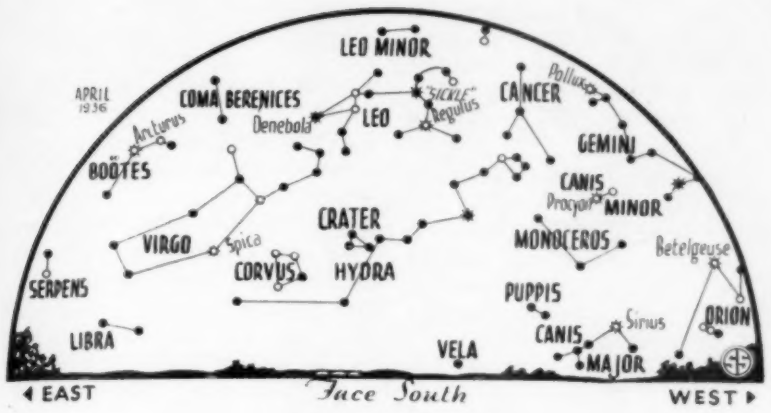
No planets are well placed this month for evening observation. Mars is theoretically an evening star, since it sets after the sun, but it is so low by the time it gets dark, and so faint, that it will be difficult to see, even early in the evening. Mercury is too near the sun all month to be seen. Venus is a morning star, in the constellations of Aquarius and Pisces, rising shortly before the sun. Saturn is also a morning star, but is very faint. At the beginning of the month Jupiter rises about midnight, in the constellation of Ophiuchus, and is really the only planet that can be seen very well at any time during the night.

Many of the constellations, practically all of the most familiar ones, date back to very early times, so far, in fact that no one can tell just where they did originate, though some authorities believe that they started in the same place, among the same group of peoples. There are many evidences of some ancient system among them, such as the duplication of some figures, as well as their arrangement. Just 88 figures are officially recognized today, and half of them are modern. Some of the newer ones are



AT ITS BEST

High over head the familiar Big Dipper, known to nearly everyone, appears to the best advantage during the month of April.



BIG AND LITTLE

Many of the celestial animals appear in twos—Major and Minor. Canis, the dog, and Leo, the lion are two of these

in parts of the sky containing no very bright stars.

Telescope Changed Maps

Since the ancients had nothing but their unaided vision with which to study the stars, these spaces were left blank, but after the telescope came into use, beginning in 1610, fainter stars were seen. Then, in the year 1685, a Polish astronomer named Hevelius published a book of star maps in which he introduced several new constellations. One of these was Canes Venatici, the hunting dogs, which is inside the curve of the handle of the great dipper. Another, Leo Minor, is above Leo, at the zenith for the times of the maps. The lynx was another; this is between Auriga and Ursa Major. The others were Sextans, the sextant; Lacerta, the lizard; Scutum, the shield, and Cerberus, which Hercules was holding. Only the last has not been retained to modern times.

Other constellations were added when astronomers began to visit the southern hemisphere and to observe stars that never rise for Europeans. Telescopium, the telescope; Fornax, the furnace; Octans, the octant; Pictor, the painter's easel, and Horologium, the clock, are some that date back to this period.

Thus our constellations have arisen from a number of sources. The modern astronomer, of course, pays no attention to the figures which they were supposed to represent, but regards them simply as areas, using the old names to designate them. Of course, the entire arrangement is a very unscientific one, and if it were being done over, a much more convenient system could doubtless be evolved. About a century ago there actually was an effort made to alter them. In his "Outlines of Astronomy," first published in 1849, Sir John Herschel, the famous son of an even more eminent father, expressed his opinion in no uncertain terms.

"Of course we do not here speak of those uncouth figures and outlines of men and monsters, which are usually scribbled over celestial globes and maps, and serve, in a rude and barbarous way, to enable us to talk of groups of stars, or districts in the heavens, by names which, though absurd or puerile in their origin, have obtained a currency from which it would be difficult to dislodge them," he wrote.

"This disregard is neither supercilious nor causeless. The constellations seem to have been almost purposely named and delineated to cause as much confusion and inconvenience as possible. Innumerable snakes twine through long and contorted areas of the heavens, where no memory can follow them: bears, lions and fishes, large and small, northern and southern, confuse all nomenclature. A better system of constellations might have been a material help as an artificial memory."

Old Names Permanent

But despite this opinion, which was and is entirely justified, the old names have been retained, and seem entirely permanent. A few years ago, however, a commission of the International Astronomical Union corrected part of the confusion. Before that, there had been no universal agreement as to the boundaries of the constellations. In 1930 the report of the commission was published. Eighty-eight were officially recognized, and their borders were made straight lines, running either east and west or north and south. There is thus no longer any ambiguity as to what constellation any particular star is in.

Phases of the Moon: full moon, April 6, 5:46 p. m. Eastern Standard Time; last quarter, April 14, 4:21 p. m., Eastern Standard Time; new moon, April 21, 7:32 a. m., Eastern Standard Time; first quarter, April 28, 6:16 a. m., Eastern Standard Time. Moon in apogee (farthest from Earth) April 6, distance —252,500 miles. Moon in perigee (nearest Earth) April 15, distance—222,400 miles.

Science News Letter, March 28, 1936

PHYSICS

Einstein Stresses Faith As the Basis of Science

By DR. W. E. DANFORTH, Bartol Research Foundation

WHEN grandfather is able to lay his hands on his reading glasses without organizing a general search of the house, when father remembers a wedding anniversary without a subtle hint or two from mother, and in numerous other instances of people behaving as they are supposed to, their associates show symptoms of surprise.

That we should likewise be surprised when the physical world behaves as it is supposed to is implied in an article by Dr. Einstein. (*Journal of the Franklin Institute*, March).

"The eternal mystery of the world is its comprehensibility," according to Dr. Einstein. The article in which he says this has been translated from the German by Dr. Jean Piccard, noted scientist and stratosphere balloonist.

Einstein was speaking, of course, not of everyday objects, but of the fact that laws of nature can be summarized by means of a few mathematical equations, and that these equations are always obeyed.

But the laws for which physicists write equations are also the laws which govern every day occurrences, the rising of the sun, the flow of water, and so forth. It is therefore but a short step from Einstein's statement to the idea that it is indeed wonderful that gasoline should burn tomorrow as it does today, that iron should continue to be attracted to a magnet.

All a matter of faith, and how lucky we are that the world is so dependable!

In the layman's view the seat of science is the laboratory. Mention that a scientist is seeking a hidden fundamental secret, and most of us will at once envision test tubes, microscopes, and huge vacuum tubes. But Dr. Einstein wishes to emphasize another phase of the mat-

ter. The really fundamental principles cannot be found in the laboratory, or, to quote him exactly, "cannot be obtained through distillation by any inductive method from the experiences lived through, but which can only be attained by free invention."

The basic laws are inventions of man's mind.

A scientist watches his apparatus perform, and then, very likely when he is least expecting it, his mind acts. A law appears which harmonizes all of the laboratory phenomena.

The science of thermodynamics is cited as an example of this. For centuries inventors have struggled to devise perpetual motion machines. All failed. And then came the brilliant flash in someone's mind.

Maybe perpetual motion is fundamentally impossible!

A simple idea? Yes, but it occurred in the mind of a genius who founded upon it the science of thermodynamics, the basic science of steam engines and electrical refrigerators.

Science News Letter, March 28, 1936

ARCHAEOLOGY

Earliest Psalm Inscribed On Clay Tablet From Syria

EARLIEST of all known psalms, is a cuneiform inscription which has puzzled scientists since the discovery of the clay tablet several years ago at Ras Shamra in North Syria. This was disclosed when Dr. Julian J. Obermann, professor of Semitic Languages at Yale University, presented the results of his work with the tablet to the Semitic and Biblical Club.

The inscription establishes the source of Hebrew psalmody which students of the Bible have sought for years in remote centers of influence such as Babylonia and Egypt. The origin of the literary expression of Hebrew prayer is traced "next door" to Palestine, Prof. Obermann stated.

Language of the tablet is that of the Canaanites, who possessed a flourishing literature about 1500 B.C. This was near the time when, according to tradition, Moses first molded into being the national religion of the Hebrews. Ancient literature of the Canaanites is being brought to light increasingly by excavations at Ras Shamra.

Puzzling at first as to its form, purpose and meaning, the text of the tablet may now be said to represent a transcription of an oral liturgy that served to accompany public worship at the great temple exhumed at the site of Ras Shamra, Prof. Obermann stated.

"Except for the fact that the cuneiform psalm is to the deity El, we would look for its identification in the prayer book of the Bible," he said. "In fact we would mistake the text both by its form, context and style for a Hebrew psalm if, instead of El, we would substitute Elohim and Jehovah. In this tablet we find in primitive form, antedating Hebrew psalmody for nearly a thousand years, all the characteristics of Biblical prayer text which the modern students of the Old Testament have endeavored to establish by methods of analysis and deduction."

Psalm Had Rhythm

It was by observing that each phrase of the psalm was accompanied by an antiphonal response that Prof. Obermann was enabled to recognize the form and purpose ot the inscription.

"Recital and response are each time so construed as to parallel one another in expression, forming together a most effective kind of primitive rhythm," Prof. Obermann said. "In all probability the art of developing euphonic stanzas by means of metrical balance and the dramatic vehemence of expression by means of close parallelism of each utterance had already been established in the literature of which the tablet is evidence. In Biblical psalmody, too, it is parallelism of expression and metrical balance of rhythm that have been found to be its most characteristic peculiarities.

"To have these peculiarities recur in cuneiform script in a center of worship in Canaan itself all but revolutionizes the concepts hitherto held in respect to the development of the liturgical writings of the Hebrews.

"Roughly speaking, the psalm on the tablet as a whole falls into three sections: ritual, supplicatory, and hymnal. The hymnal section is comparable to the Hallelujah litanies in the annals of our own church."

Science News Letter, March 28, 1936

PHYSICS-PSYCHOLOGY

Colors Mean More to Women Than to Men

By CHARLES BITTINGER, Artist and Physicist, Washington, D. C.

WOMEN are much more interested in color than men are.

Of course, women have more scope for applying color, since they go in for make-up and for rainbow-colored clothes, and since women generally have a good deal to say about decoration of the home.

There is a physiological reason, besides. Women are rarely color blind. In fact, color blindness is ten times more common among men than among women. Women may be carriers of color blindness, perfectly capable of telling red from green and blue from yellow, and yet conveying to their male children some type of visual defect that prevents the boy from seeing all colors in their true light.

It is not remarkable that women often complain of difficulty in matching colors. The dye vats of the color industry turn out thousands of tints and shades of each color, and I have been told that it is theoretically possible to have approximately two million colors. At least, the eye is supposed to be able to detect a difference of hue, saturation, and brightness in two million colors.

Some people can carry colors in their minds with unusual success, but never to the degree of accuracy that a sound can be carried. A singer can produce what is called perfect pitch. That cannot be done in our minds with colors.

Light Changes "Match"

There is a popular belief that if colors match in daylight they will match at all times. But, in reality, two colors that match in daylight may be glaringly different under ordinary electric light, which ordinarily contains a good deal of yellow or orange.

Matching colors in different materials—a green ribbon bow to a green velvet frock, for instance—is often difficult, because the materials differ in a surface quality, which a physicist would call the specular reflection.

It amounts to this: Textiles that are flat or deep piled, dull or shiny, catch the light differently. Velvet contains thousands of little pockets that trap the light and prevent it from being reflected. So even though two kinds of textile are green, dipped in the same dye, this

phenomenon of light striking differently on different surfaces will modify the general look of a fabric, and so two green objects may appear disturbingly different.

The darkest material produced is velvet dyed black, due to the fact, already mentioned, that velvet contains thousands of pockets that trap the light.

Black, of course, is simply a general name for any color of low reflecting power. A great many blacks in fabrics are made from dyes of complementary colors—that is colors that mix to produce black, such as purple and green. You hear people speak of a black suit that faded or turned green. That happens when one part of the dye fades. If the purple fades before the green, the black garment takes on a greenish tinge. If the green fades first, it leaves a purplish black.

Because of the importance of light in creating color, colors becoming to an individual in the day may be unbecoming at night. This is particularly worth watching in the range of colors between blue and green, due to the yellowing effect of most artificial light.

In feminine make-up, most women know that it takes more rouge at night to produce the same effect of red as in daylight. If a woman desires her skin to look white under yellowish artificial light, she might have the powder slightly more blue than would be possible in a daylight make-up.

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●RADIO

March 31, 4:45 p.m., E.S.T.

THE EARTHQUAKE—MENACE AND TOOL—Captain N. H. Heck of the U. S. Coast and Geodetic Survey.

April 7, 3:15 p. m., E. S. T.

THREE IMPORTANT INITIALS—U. S. P.—Dr. E. Fullerton Cook of the Philadelphia College of Pharmacy.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

ENGINEERING

Streamlined Steam Locomotive Uses Airplane Principles

THE SCIENCE of aerodynamics, and airplane construction itself, were called upon in the design of the new ultra-streamlined locomotive of the Pennsylvania Railroad.

For the first time horizontal "fins," designed like airplane wings, have been placed around the smokestack of a locomotive so that the smoke issuing from it will rise upward, away from both locomotive and cars. While this means added comfort to passengers, the big advantage is in insuring visibility at all times for the engineer.

Exhaustive tests showed that smoke descended on a train in fast motion because of low pressure areas, created by the previous design of steam locomotives. The present arrangement of "fins" obviates these low pressure areas and thus the smoke is swept upward at an angle clear of the train.

Vertical fins had been used in England and abroad, but the narrow gauge of American railroads, compared to foreign tracks, caused these vertical fins to interfere with the engineer's view.

The designer, Raymond Loewy, working with seven-foot models in a wind tunnel, conceived the idea of working with clay instead of wood models.

The clay models were suspended in a wind tunnel, above a moving belt, and thus approximated actual running conditions. Smoke bombs were used to simulate smoke from the locomotive and in this way 24 models were tested and "moulded." From these four were picked, and finally the chosen design.

The smoke deflectors are only one feature of this ultra-streamlined engine, however. With the clay models the very last word in streamlining could be achieved, and the present locomotive has shown that, by virtue of its "nose" and general lines, at maximum speed more than one-third of the wind resistance has been cut down; equivalent to a saving of 300 horsepower.

The model tests were carried out in the aerodynamic laboratory at New York University, where silken threads were suspended in the tunnel to study the air currents. If the threads remained firm in the "slip-stream" the streamlining was correct. A vibrating thread showed imperfect streamlining and the clay model was worked until the desired perfection was attained.

The "nose" of the new locomotive conceals an old-fashioned "cow-catcher" and is covered with one-inch steel. The coupling is covered with an arrangement like a roll top desk. This smooth front is expected to minimize accidents should any object be struck, for the old-fashioned exposed coupling had a tendency to drag objects under when struck.

The new locomotive is of the "4-6-2" wheel arrangement. It has a four-wheel front truck, six drivers eighty inches in diameter, and a two-wheel rear truck. The locomotive weighs 337,850 pounds, and the tender loaded 289,700 pounds. The coupled length of the tender and locomotive is 95 feet.

The ultra-streamlined locomotive is to be used where there is no electrification.

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MODERN STREAMLINING

The newest in this series showing the evolution of the most modern streamlined locomotives showed how the steam locomotive is borrowing from the airplane principles of air deflection in order to rid the train of smoke.

BOTANY

NATURE RAMBLINGS
by Frank Thone

Uncurling Ferns

FERNS are beginning to come up in woods all over the northern half of the world just now, wherever spring has arrived. There are hundreds of species of them, and they vary in structure and appearance as widely as can well be imagined. Yet they all open up their leaves in exactly the same way: by rolling them out of a tight spiral coil. Not only the main stem, but each leaflet, and in the fine-leaved ferns each subdivision of the leaflet, faithfully repeats this pattern.

Ferns are practically alone among plants in opening their leaves in this way. Only one other group, the cycads of tropical and subtropical lands, have this leaf-uncurling habit. And it is pretty well agreed that cycads and ferns are children of a common ancestry.

There is something very appealing to the basic esthetic sense of mankind in this graceful spiral pattern, so that we see these uncurling young fern leaves in all sorts of decoration and design. Sometimes they are even credited with influencing a design, when the resemblance is probably only coincidental.

Thus, it is often asserted that the elaborately carved and molded heads on the croziers used as badges of office by bishops of the Catholic and Episcopal churches are modeled after the tips of uncurling fern leaves. This idea seems to have arisen since artists, striving to make ecclesiastical decorations always more beautiful, added leaves and even flowers to the carvings of the crozier-heads.

Actually, however, these croziers originated as simple shepherd's crooks, to symbolize the churchmen's "pastoral" relation to the faithful. It was the enthusiasm of the artists that curled the simple crook shape into a spiral and proliferated so many ornaments on it.

Science News Letter, March 28, 1936

PHYSICS

Super-Speed Cosmic Rays "Clocked" by Scientist

LIGHT travels exceedingly fast; and 10,000,000,000 volts of energy is a lot. A cosmic ray electron whizzing along with the speed of light and having this much energy is not an easy thing to handle; not exactly the sort of thing you would time with a stop watch. But physicists can measure energies of cosmic rays, thanks to magnetism and the Wilson cloud chamber.

Heretofore rays having energies up to four billion volts have been measured but none higher. Now comes word from Paris that ten billion volt rays have been mastered.

To measure such energies, physicists see how much a ray is bent by a magnetic field. Given strong enough magnets, theoretically any energies could be measured. But strong magnets are expensive.

Dr. Louis Le prince-Ringuet describes in Nature, published in London, another solution of the problem. Instead of making the magnet stronger he makes his cloud chamber longer and so can more easily detect smaller amounts of bending.

Other physicists have measured the cosmic ray super-energies by using the earth's magnetic field. From the decrease in the number of rays which take place when one approaches the equator the energy can be calculated; also the fact that more rays come from the east means that the majority of them carry positive electric charges.

Dr. Le prince-Ringuet's experiments confirm these results. He finds that nearly all of the very high energy rays are positive, and that the lower energy ones are half positive, half negative.

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PHYSIOLOGY

Hypnotic "Sleep" Not Same As Real Sleep, Waves Show

HYPNOTIC "sleep" is not at all like real sleep, at least in the physiological state of the brain.

Evidence to this effect has been produced at the private research laboratory of Dr. Alfred L. Loomis, in "brain wave" studies conducted jointly by Dr. Loomis, Prof. E. Newton Harvey of Princeton University, and Garret Hobart of the Loomis Laboratory. Brain waves were registered from the same person in waking, normal sleeping, and hypnotic states. The wave patterns produced under hypnosis were like those of a waking rather than a sleeping person.

The researchers therefore conclude, "It would seem that the term hypnotic 'sleep' is not a correct one for the hypnotic state, at least as measured by this criterion." (*Science*, Mar. 6).

Brain waves are rapid, rhythmic fluctuations in the electric potential of the brain. Waking persons, with their eyes closed and under no mental stress, produce them in such a way that they register on the recording apparatus in patterns called "trains." Sleeping persons produce a much more rapidly fluctuating type of pattern, referred to as "spindles," and also irregular random waves.

The hypnotized person in the experiment produced the brain-wave "trains" of a waking person, not the "spindles" and random waves of a sleeper. He produced the "trains," however, only when it was suggested to him that his eyes were closed, though they remained open.

Waking persons in a totally dark room produce brain waves in "trains," but if the tiniest spot of light is turned on, the "trains" stop at once.

Moderate mental activity does not seem to upset the regularity of arrival of the brain wave "trains." A person sitting quietly with his eyes shut keeps on producing them if some one else reads to him, or if he does simple mental problems in arithmetic. But in a difficult or embarrassing mental or emotional situation, the "trains" usually stop.

Science News Letter, March 28, 1936

•First Glances at New Books

Chemistry

ORGANIC CHEMISTRY—James Bryant Conant—*Macmillan*, 293 p., $2.60. Harvard University's president revises his popular text on introductory organic chemistry with the assistance of Dr. Max Tishler. Introduction to the subject is through the alcohols rather than the hydrocarbons. Theoretical interpretations based on electronic theory have been omitted but much biochemical material has been added.

Science News Letter, March 28, 1936

Industrial Chemistry

LATEX IN INDUSTRY—Royce J. Noble—*Rubber Age*, 384 p., $7. Review of all the applications of rubber latex known to industry together with condensed information regarding the physical properties, compounding, and manufacture of latex. Primarily of interest to the rubber technologist.

Science News Letter, March 28, 1936

Sport

TYING AMERICAN TROUT LURES—Reuben R. Cross—*Dodd, Mead*, 55 p., $2. Sons of Izaak who wish to add a fascinating hobby to their fascinating sport will find instructions in this pointedly illustrated book, written by one who knows.

Science News Letter, March 28, 1936

Morphology

MORPHOLOGY OF THE COLEOPTEROUS FAMILY STAPHYLINIDAE—Richard E. Blackwelder—*Smithsonian Institution*, 102 p., 30 figures, 10c.

Science News Letter, March 28, 1936

Meteorology

WEATHER AND CLIMATE — Clarence E. Koeppe — *McKnight & McKnight*, 135 p., 80c. A revision of an earlier workbook, with considerable amounts of new material added. In a field of college science instruction at present not at all well occupied, this new edition should prove very useful.

Science News Letter, March 28, 1936

Astrophysics

OBSERVING THE SUN AT 19,300 FEET ALTITUDE, MOUNT AUNCONQUILCHA, CHILE—C. P. Butler—*Smithsonian Institution*, 4 p., 5c. (See p. 200)

Science News Letter, March 28, 1936

Aquaria

AN AQUARIUM BOOK FOR BOYS AND GIRLS—Alfred Morgan—*Scribner's*, 180 p., $2. Written in a style to be understood by boys and girls old enough to begin their first unsuperintended efforts at keeping frogs and fish, tadpoles and turtles, simply but vividly illustrated, this book should contribute much to the promotion of one of the most popular and instructive of present-day hobbies.

Science News Letter, March 28, 1936

Forestry

POSSIBILITIES OF SHELTERBELT PLANTING IN THE PLAINS REGION — Lake States Forest Exp. Sta., U. S. Forest Service—*Govt. Print. Off.*, 201 p., 75c. A detailed discussion of the agronomic, ecological, and forestry problems to be encountered by those who would build growths of trees in the eastern Plains region. While technical discussions are not shirked, the book still offers the interested non-professional reader a great deal of easily understood and highly interesting information.

Science News Letter, March 28, 1936

Gardening

THE GARDENER'S FIRST YEAR—Alfred Bates; Illustrations by the author—*Longmans, Green*, 246 p., $2. A book for bright youngsters about twelve years old. In addition to telling how to make and take care of a garden, it gives a lot of information about some of the most commonly cultivated flowers, including their botanical names and the meanings of these formidable Latin words.

Science News Letter, March 28, 1936

Ornithology

295 AMERICAN BIRDS—From *Bird Portraits in Color*, by Thomas S. Roberts—*Univ. of Minnesota Press*, 90 color plates and index, $2. The plates are by Brooks, Sutton, Weber, Jaques, Breckenridge, and one by the late Louis Agassiz Fuertes. With such a bush, need one say more of the wine?

Science News Letter, March 28, 1936

Vital Statistics

BIRTH, STILLBIRTH, AND INFANT MORTALITY STATISTICS FOR THE CONTINENTAL UNITED STATES, THE TERRITORY OF HAWAII, THE VIRGIN ISLANDS, 1933—U. S. Bureau of the Census—*Govt. Print. Off.*, 217 p., $1.50.

Science News Letter, March 28, 1936

Astronomy

THROUGH THE TELESCOPE—Edward Arthur Fath—*Whittlesey House*, 220 p., $2.75. Non-technical book on astronomy in which the reader is taken to the Lick and Mount Wilson observatories, placed in an astronomer's viewing chair at the end of the great telescope and the heavens described for him. The operation of the apparatus at these two observatories is told with pictures and text.

Science News Letter, March 28, 1936

Forestry

ARTIFICIAL REFORESTATION IN THE SOUTHERN PINE REGION—Philip C. Wakeley—*Govt. Print. Off.*, 114 p., 15c.

Science News Letter, March 28, 1936

Entomology

THE GENUS PANSCOPUS SCHOENHERR (COLEOPTERA: CURCULIONIDAE) —L. L. Buchanan—*Smithsonian Institution*, 18 p., 10c.

Science News Letter, March 28, 1936

Marine Biology

FOUR NEW BRITTLESTARS FROM PUERTO RICO — Austin H. Clark — *Smithsonian Institution*, 8 p., 3 pl., 10c.

Science News Letter, March 28, 1936

Botany

ILLUSTRATIONS OF NORTH AMERICAN PITCHERPLANTS—Mary Vaux Walcott; Descriptions and notes on distribution by Edgar T. Wherry; Notes on insect associates by Frank Morton Jones—*Smithsonian Institution*, 15 colored plates, 34 p. text, $25. This publication will afford great satisfaction to two distinct classes of persons, usually thought of as quite divergent, or even opposed, in their interests. The person of artistic or esthetic tastes will find in Mrs. Walcott's drawings great beauty, and the unusualness of their subject will only add piquancy to their charm. To the botanist the work is a monograph of high merit, combining authority of text and meticulous accuracy of illustration. The Smithsonian Institution is to be congratulated on its sponsorship of this unique, valuable and beautiful piece of scientific publication.

Science News Letter, March 28, 1936